

*Contribution to the Study of Cerebral
Surgery Based on an Operation for
the Removal of a Tumor.*

BY

M. H. RICHARDSON, M.D.,

VISITING SURGEON TO THE MASSACHUSETTS GENERAL HOSPITAL; ASSISTANT
PROFESSOR OF ANATOMY, HARVARD UNIVERSITY,

AND

G. L. WALTON, M.D.,

PHYSICIAN TO NEUROLOGICAL DEPARTMENT, MASSACHUSETTS GENERAL HOSPITAL;
CLINICAL INSTRUCTOR IN NEUROLOGY, HARVARD UNIVERSITY.

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CONTRIBUTION TO THE STUDY OF CEREBRAL SURGERY
BASED ON AN OPERATION FOR THE REMOVAL
OF A TUMOR.

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THE number of reported cases of cerebral surgery is singularly small in comparison with the extent of literature on the subject in the abstract. In a recent article describing three fatal cases, McBurney and Starr state that they have been able to find reports of only eighty-seven cases in which surgical relief of tumor of the brain has been attempted. When we consider the advance made both in cerebral localization and in surgical technique since the subject was broached, this seems an extremely meagre collection upon which to rely for actual data regarding symptomatology, course, and prognosis of operable growths. That the actual number of cases far exceeds this estimate is beyond question.

It is natural that cases resulting unfavorably should not be reported with such enthusiasm as the successful ones; but it seems the duty of the practitioner to report all cases, both successful and unsuccessful, in so important a branch of medicine and surgery as this, limited as actual experience must of necessity be—first because operable tumors are of comparative rarity, and secondly because of the reluctance on the part of the patient or his family to submit to an operation of this magnitude; to say nothing of the hesitation on the part of the practitioner to advise this step except where absolutely sure of his ground. That there is much uncertainty in connection with this subject, even at the best, is evident when we realize that the most marked focal symptoms, including local spasm and paralysis, may be present without demonstrable lesion in the locality indicated by such symptoms, and conversely that the motor tract may be invaded by a gross lesion, apparently sufficient to have produced both irritation and destruction, without giving a clue during life to its seat, or even existence. Not that these exceptional cases detract in any degree from the established facts regarding cerebral localization, which are now too firmly fixed to admit of question, but practically their

remembrance cannot but serve to temper the zeal both of the neurologist and the surgeon.

As an example of the former type of uncertainty in cerebral localization, we would mention a case occurring in the Massachusetts General Hospital, where an abscess had been opened in the temporal lobe, resulting from extension of ear disease. A few days later localized spasms suddenly appeared, limited to the hand of the opposite side, and accompanied by corresponding weakness. Metastatic process was at once diagnosticated, and a new opening was made over the hand centre, with an absolutely negative result, beyond a rather free serous discharge. Post-mortem examination revealed nothing definite beyond the temporal abscess. Such cases detract in no degree from the accuracy of our knowledge regarding the hand centre, nor should they deter us from making at least an exploratory excision over the hand area; they do show, however, conclusively, that distant lesions may set up an irritability of motor centres—an element always to be borne in mind when we are tempted to assure the family of success in a given case.

Each reported case, successful or unsuccessful, adds something to our stock of knowledge in this by no means exhausted field.

The percentage given by the writers above alluded to (*THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES*, vol. cv. No. 252) both of success in finding the tumor and of recovery after removal, is probably larger than it would be if all unsuccessful operations were faithfully reported; but even making due allowance for this probability, we have left a result sufficiently gratifying to mark a most important era in surgery and neurology—by no means less important from the point of view of the patient and the practitioner than of medical science in the abstract, in that it offers at least a hope of relief in one of the most serious of ills to which humanity is subject.

The patient whose case we have to report—T. B., of Springfield, aged forty years, married—was under the care of Dr. C. P. Hooker, of that city, who first called Dr. Walton to see the case on February 22, 1892.

The history was as follows: He had been subject for some time to occasional attacks of headache of brief duration, and at times found difficulty in expressing himself. At first these attacks occurred only at intervals of two weeks, then of a week, then of only a few days. This was about the frequency when he first consulted Dr. Hooker, about a month ago. The attacks had now increased in intensity and frequency, so that the pain was almost unbearable, and he had had as many as two in an hour. The pain was rather worse at night. A fortnight previously he had seen double, the images being horizontally placed. Of late a red spot had appeared in the field of vision, situated somewhat to the left. There was considerable photophobia—worse on the left. He had had no trouble in understanding what people said, as regards the words, but had been unable at times to connect the idea with the word, both spoken and written. For example, he did not realize the meaning

of the word "Blaine" (word-deafness); and, again, could not tell whether the number 3650 on a box corresponded to 3650 on a shelf (mind-blindness). He kept saying "barrel of lead" for "loaf of bread," though he knew what he wanted (ataxic aphasia). His previous health was good; his family history negative.

Physical examination showed a large, well-developed man. The pulse was 64, full and soft. The gait was normal; there was no paralysis of motion or sensation. The pupils were alike and reacted to light. There was paresis of the abducens oculi on the left. The patient spoke slowly, and occasionally misplaced words, always correcting himself, however. During an attack of pain the pulse dropped to 48. There was homonymous restriction of the field of vision on the right (hemianopsia) falling short of the median line.

The acuity of vision was unaffected. The fundus showed a haziness which suggested commencing optic neuritis, though the edges of the nerve were distinct and there were no hemorrhages.

It was decided best to postpone operation long enough to give specific treatment a full trial, though nothing in the history indicated this etiology. (The event proved that the new growth was not of specific nature).

This treatment was faithfully carried out by Dr. Hooker during the next few weeks. Three days after Dr. Walton's visit he was taking 95 grains of potassium iodide *per diem*. At this time the left pupil seemed slightly larger than the right, and reacted sluggishly to light.

One week later Dr. Hooker wrote:

SPRINGFIELD, March 1, 1892.

DEAR DOCTOR: Concerning B., headache so intense that he requires morphine, gr. $\frac{1}{2}$, with atropine, gr. $\frac{1}{150}$, every morning and night. Before use of morphine the pain was constant and severe, with half-hourly exacerbations. At this time, pulse 40 and skin bathed in sweat. Pain localized more in left occipital region, near median line, just above protuberance. Ataxic aphasia much more marked; hardly utters a sentence without mispronouncing one or more words or substituting some word which sometimes makes sense, more often does not. Difficult to understand him. Appetite indifferent. Vomits three or four times a day—no connection with taking food. The vomiting seems more like regurgitation, and is often copious—for example, half a chamberpotful. No paralysis except of sixth. Diplopia marked to-day. Think his mind is a trifle cloudy. Potassium iodide, gr. 110, to-day. I do not think potassium iodide has anything to do with his symptoms. Thought possibly morphine might make him a trifle dull. The nausea is not such as we see with morphine.

Will write again this week and give you result of ophthalmoscopic examination.

Yours in haste,

C. P. HOOKER.

Three days later he wrote as follows:

SPRINGFIELD, March 4, 1892.

DEAR DOCTOR: Yours of the 3d received. Dr. Morgan examined B.'s eyes yesterday—finding double optic neuritis. The nerve is not visible in either eye and is swollen fully $3\frac{1}{2}$ D. There are multiple hemorrhages. The pain is more occipital than ever. All the symptoms seem more intensified. He is weaker and confined to his bed. Night before last I made a minute of some of his errors of speech. Notice the fact that in nearly every one the letter L is either omitted or unnecessarily put in: *Glood for gruel*; *bleefsteak for beefsteak*; *expain for explain*; *mate for late*; *sweeping for sleeping*; *speak for sleep*. He attempted to say *first-rate*, said *first-nete*, noticed his error and in attempting to correct it said *first-nice*—this seemed to satisfy him. Mrs.

B. made an error in giving him the iodide, so he has not taken as much as I thought he had; however, he will take 165 grains to-day. He cannot take it in milk, but bears it well in seltzer water. Think they would sanction an operation if I said so, but I am of the opinion that he is past all medical or surgical aid. I am using from $\frac{1}{2}$ to $\frac{3}{4}$ gr. of morphine in twenty-four hours, to control his pain.

Sincerely yours,
C. P. H.

Two weeks later Dr. Hooker wrote that his sight was decidedly worse and that it was very difficult for him to express himself. His general condition was more unfavorable, and he vomited nearly everything ingested. At this time he was taking 210 grains of the iodide *per diem*. He complained also of vertigo, and it was hard to make him answer questions. He had failed that day more than on any three previous days. On the following day a consultation with Dr. Richardson was held, and operation decided to be imperative.

His condition before operation was as follows:

He lies in bed quiet; hiccoughs from time to time; subsultus is present. Complains of pain behind the left ear. He has lost flesh and strength decidedly. The double vision is so troublesome that he keeps the left eye closed. Aphasia is marked. Calls pain, "eye." Pulse, 100; temperature, 99.3°. Tongue normal. When he tries to speak a long sentence it becomes practically unintelligible. The knee-jerk is absent on both sides.

It was decided that we had to do with a rather large tumor on the left side, of unknown nature and origin, seated posteriorly to the motor tract, involving either directly or by pressure the occipital lobe (affection of vision), the angular gyrus (mind-blindness), the posterior part of the temporal lobe (word-deafness), and possibly the island of Reil (aphasia). The paralysis of the sixth nerve was considered due to pressure downward, not to direct involvement of its course at the base of the brain. This is a not infrequent symptom in large growths, on account of the long course of this nerve over bony prominences; moreover, the post-mortem examination justified this conclusion. It was considered on the whole best to include the angular gyrus and occipital lobe in the exploration, on account of the prominence of ocular symptoms, hemianopsia, mind-blindness, and red spots in the field of vision. The two latter pointed to cortical irritation in the region of the angular gyrus, or to association fibres passing to it, and made it probable that the hemianopsia resulted directly from injury to the occipital lobe or optic radiations rather than from pressure upon the optic tract.

Operation. The operation was performed at the patient's house by Dr. Richardson; Drs. Hooker and Herrick, of Springfield, Dr. Mumford, of Boston, and Dr. Swasey, of New York, assisting. Dr. Walton was present and advised regarding the various steps of the operation.

Previous to the operation the head had been shaved and the skin rendered as thoroughly aseptic as possible by soap, prolonged mechanical cleansing, and bichloride poulticing. The patient took ether well. A crescentic incision was made over the area decided upon, the convexity upward and backward, the diameter of the space involved being about three inches. The bleeding was profuse, but easily controlled by catch forceps. The skull was exposed and the periosteum turned back. With a three-quarter-inch trephine the cranial cavity was opened behind and below the parietal eminence, about two inches behind the

fissure of Rolando. This opening was enlarged forward and upward with rongeur forceps. The dura mater was tense, bulging, and non-pulsating. There was nothing remarkable about its color. A flap was turned back in the usual manner, upon which there was a striking protrusion and eversion of the cortex that indicated extreme pressure from within. The everted brain substance was apparently granular in character.

There was very considerable hemorrhage, which was with difficulty controlled by the gauze tampon and numerous ligatures. The operator then introduced the finger readily into the cranial cavity. All parts within a radius of three inches were thoroughly explored, but no definite tumor boundaries were detected, nor did any induration appear, the peculiarly altered brain substance and the extreme pressure only pointing to the presence of the tumor below. (This brain substance proved on autopsy to be commencing new growth of similar character, though of less density, than the underlying tumor proper.) Further enlargement of the opening in the skull was considered, but was abandoned owing to the everted brain overlapping the already exposed edges, with the probable extent of the proposed operation, the presumably large size and deep seat of the tumor, and the very alarming condition of the patient. Under these circumstances, after consultation, it was thought best to abandon further exploration.

The question of removing the cerebral hernia was considered, but this was thought unnecessary.

The flap of dura was replaced as far as possible, and the skin was easily brought into its proper position and secured with six interrupted silver wire stitches. Provision for drainage of the very considerable hemorrhagic oozing was made by iodoform gauze wicking, and a large absorbent dressing was applied.

The patient was put to bed, and after being stimulated rallied quickly, and completely recovered from the ether in a few hours.

On the following day Dr. Hooker writes:

SPRINGFIELD, March 11, 1892.

DEAR DOCTOR: B. is in good condition. Temperature, 99°; pulse, 90-132, steady. There has been no vomiting or attempt to vomit since the operation. Aphasic symptoms are much exaggerated, except when first spoken to; then he is coherent for a few moments. Eyes look more normal and he does not close the left eye when speaking, as he has for weeks. The subsultus was noticed this morning for the first time since operation. The bandages have not stained through, and there are no signs of suppuration. Aside from his rapid pulse and increased aphasia, he is more comfortable than before operation.

Yours truly,

C. P. HOOKER.

Three days after operation Dr. Hooker writes:

SPRINGFIELD, March 13, 1892.

DEAR DOCTOR: Our patient, B., is in a decidedly comfortable condition. There has been absolutely no rise of temperature since the operation; the dressings remain intact, without showing a stain of oozing; his mind is clear, or nearly so; the aphasia, very marked for three days after operation, is now better than before, and he writes his name characteristically and legibly. His vision is better, and there is no complaint of diplopia.

Certain it is that the operation was successful in a palliative way, if in no other. There is no pain except such as comes from the pressure of the tight

head bandage. I keep him under morphine, but have not increased the dose—half a grain twice daily.

I shall remove the dressings in a few days.

Yours sincerely,

C. P. HOOKER.

The following letters were received regarding the condition from this time until the death of the patient:

SPRINGFIELD, March 24, 1892.

DEAR DOCTOR: B's condition still remains favorable, and he is very cheerful and happy. The aphasia, while noticeable, is, by a comparatively easy effort, corrected. He has complained of a slight pain on the right side, in the parietal region, just above the squamous portion of the temporal, I should judge. He was inclined, a few days ago, to be babyish, but that has passed away. His mind is not as clear as before, but I think it is improving. I dressed the head yesterday, and there was no pus. The tumor under the scalp is four inches in its longest diameter, three and a half inches in its shortest, and projects from the skull about three-quarters of an inch. Its contour is as convex as a half-orange. There is a slight oozing from the drainage-tube, which I removed and cleaned in peroxide, that seems to be broken-down brain matter. Its consistency is about like that of laudable pus; its color a muddy pink, *i. e.*, slaty pink; quantity about two drachms in six days. The extruded brain which I mentioned is flattened and shrunken. One opening, about the size of a buckshot, remained when the gauze was inserted. Morphine, half a grain once daily.

I enclose a sample of his writing, done this morning while in a semi-recumbent attitude, twisting the body for light, the paper held on a book.

I think the vision very much impaired, for he does not seem to be able to see ordinary large type. Perhaps he has an inability to comprehend the significance of written or printed characters (?). It is a remarkable case, and the operation was justifiable if for no other reason than that it gave him such great relief and prolonged existence.

Yours truly,

C. P. HOOKER.

SPRINGFIELD, March 28, 1892.

DEAR DOCTOR: B.'s condition is not quite so favorable, though there are no special developments. The temperature went up to 100 last night, so I removed the dressing. I found the tumor not enlarged—if anything slightly smaller; marked pulsation throughout; portion around drainage-tube covered with thin layer of pus; pus also exuding from the tube. I removed the tube and syringed with peroxide. The place where gauze was inserted shows ragged brain tissue, flattened to the level of the scalp and disintegrating. The aphasia, while it is very apparent, is corrected with comparative ease. No pain or tenderness. No diplopia. Vision is very feeble, however. I think his mind is somewhat dull. He sits up daily and is able to walk about. His appetite is good. Bowels act with salines. One peculiarity is that he has no conception of the meaning of figures. When asked his age (his birthday comes the 29th), he said he was fourteen.

He has gained in flesh, looks fairly well, and is very cheerful.

Yours truly,

C. P. HOOKER.

SPRINGFIELD, April 6th, 1892.

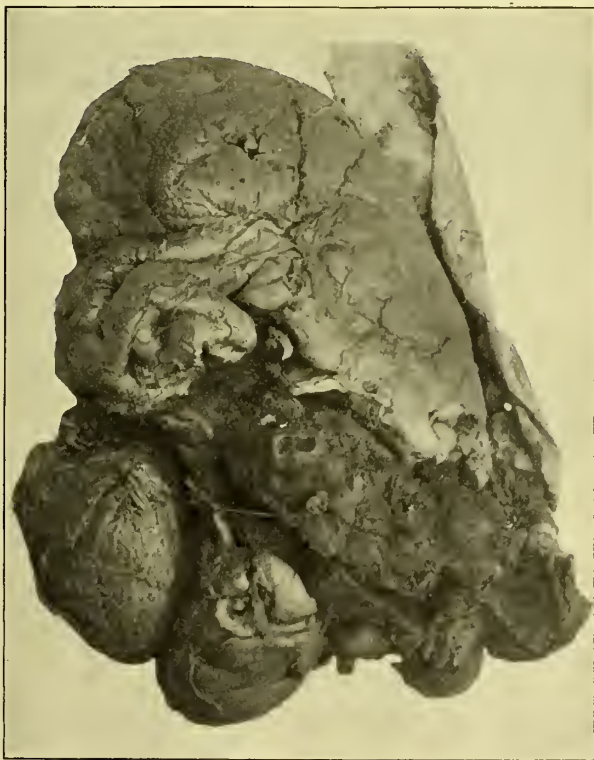
DEAR DOCTOR: Our patient, B., is on the down grade. March 26th seems to mark the day when his bad symptoms developed. He has steadily lost ground since then, though he is by no means in such a desperate condition as he was the morning of operation. I should think that, unless some unforeseen complication arises, he might live a month or more. He is dense, and the aphasia is very marked, so marked that at times it is not possible to comprehend him. Again, by ingenious guessing, one can make out his meaning. He is discouraged and fearful—threatening to terminate his existence for fear of the loss of his reason. There is slight incoördination in the movements

of the right arm, and the hand-grasp of the right is distinctly weaker than that of the left. The cicatrix is gradually stretching apart, and the brain tumor is increasing. There is free suppuration—so free that a daily dressing is required. Notwithstanding, the temperature has never been over 100° , and is normal to-day—never has reached 100° but once. I syringe the wound with peroxide, and keep on a sublimate dressing. I could not possibly keep the wound aseptic.

Yours sincerely, C. P. HOOKER.

The patient died on April 23d—fifty-one days after operation.

The autopsy showed a more or less lobulated, pear-shaped mass occupying the region of the posterior parietal and anterior part of the occipital lobe on the left side, lying quite loosely attached. The growth penetrated nearly to the mesial surface of the brain. The temporal lobe seems to



have been pushed downward and the occipital lobe backward by the growth. Its consistency was somewhat firmer than that of the brain substance, was easily distinguishable from it, in places being separated by a narrow fissure; at other places, especially at the vertex, running gradually into the brain substance, so that entire enucleation of the growth would have been impossible. The edges of brain surrounding it were ragged, and evidently infiltrated with a new growth.

Microscopic examination showed it to be a highly vascularized round-cell growth, with a large amount of very finely fibrillated intercellular substance. Diagnosis, glioma. (Dr. W. F. Whitney.)

REMARKS.—The pathological findings in the case demonstrate the practical accuracy of the localization—namely, that the bulk of pressure was in the region of the angular gyrus and involving the occipital lobe. The immunity of the speech centre from actual new growth justifies the conclusion that the aphasia was the result of pressure, or of affection of the association fibres and sensory factors necessary to speech, or to both, rather than to implication of the speech centre. The mind-deafness was due to the involvement of the posterior part of the temporal lobes. It will be seen by the accompanying cut that the temporal lobes were somewhat twisted by the pressure, so that the fissures became more nearly vertical than horizontal. The fissure of Sylvius was also pressed forward so as to become more vertical than is normal. The motor centres were practically intact, as was to have been expected. The tumor was apparently of very rapid growth, and, large as it was at the time of operation, it was much larger at the time of death. It had doubtless also pressed toward the surface, partly by natural growth, and partly on account of lessened resistance in that direction. Dr. Whitney states that a piece of the cortex removed at the operation, and given him for examination, showed much the same structure microscopically as the tumor, though less dense. It is possible, therefore, that the tumor proper eluded the touch of the operator partly by the deep situation of the portion directly under the point of operation, and partly on account of the very slight difference in its consistency from that of the protruding brain. In a similar case, on such a marked protrusion of brain, the writers would be inclined to enlarge the opening indefinitely, to explore further, and remove everything possible, for the absolute hopelessness of expectant treatment being apparent, it would seem wise to give the patient the benefit of an exhaustive search, even in spite of the dangers of the operation.

The difficulty in using the rongeur forceps to enlarge the opening in the skull after the dura mater was opened and the brain literally pouring out, would lead us in another case, where so great evidence of pressure existed, to enlarge the opening, before cutting the dura mater, to the fullest extent likely to be required. The disadvantage in this procedure is the uncertainty in which direction to extend the opening, a disadvantage which is more than counterbalanced by the increased facility in operating, especially as it is a matter of comparatively little moment if the opening proves somewhat larger than necessary—a most improbable situation in any event. The plan of cutting out a semicircle of bone and reflecting skull and skin together, breaking the lower edge for the purpose, certainly offers the advantage of sufficient room for exploration, but has not recommended itself to the writers as necessarily more practicable than the old method of trephining and enlarging. In the first

place, we feel safer with the bone removed than replaced, even when replaced under the most favorable circumstances.

The absence of even larger pieces of bone, though apparently disadvantageous, has been proved by experience to detract in no material way either from the patient's comfort or safety, whereas replaced bone is always a possible source of future trouble.

With regard to the hemianopsia, it seems probable that its origin was central, as supposed, *i. e.*, due to involvement of the occipital lobes and optic radiations. The optic tracts themselves were apparently intact. A noticeable feature shown by the fields is an homonomous retraction, alike in both eyes, but not reaching the middle line. This form of hemianopsia is less common than complete hemianopsia, or even loss of a quadrant, but has been already observed.

The subsequent history of the case would seem to justify leaving the protruding brain untouched, for its presence certainly affected in no way unfavorably the progress of the case, which was certainly remarkable, the relief of pressure symptoms alone justifying operation.

